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UNITED STATES DEPARTMENT OF AGRICULTURE
BULLETIN No. 853
OFFICE OF THE SECRETARY
Contribution from the Office of Farm Management
H. C. TAYLOR, Chief

Washington, D. C. ▼ July 20, 1920

THE ORGANIZATION AND MANAGEMENT OF FARMS IN NORTHWESTERN PENNSYLVANIA

AN ANALYSIS OF THE BUSINESS OF 422 FARMS IN THE VICINITY OF GROVE CITY, PA.

By
EARL D. STRAIT, Scientific Assistant
H. M. DIXON, Assistant Agriculturist

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OBJECT OF STUDY.

The object of this study was to obtain, through a detailed analysis of 422 farms, information relative to farm organization, crop production, and profits for an area which was representative of numerous similar areas in western Pennsylvania, southwestern New York, eastern Ohio, and parts of West Virginia. The study has a particular significance in view of the changes which have been taking place in the agriculture of this region during the past few years. Until recently the farming practiced throughout this region was of the general crop and live-stock type. Many of the farms are of such size that their operators have found it more profitable to obtain some outside employment during a part of the year than to operate them continuously.

In the spring of 1915 a creamery was organized at Grove City, the market center for these farmers, and an interest in this industry was immediately manifested by many of them. This resulted not only in a general increase in the number of dairy cows in this section but also in a definite change to the dairy type of farming by a number of these farmers. The present study, covering the farm year 1916, was made two years after the new industry had been introduced.

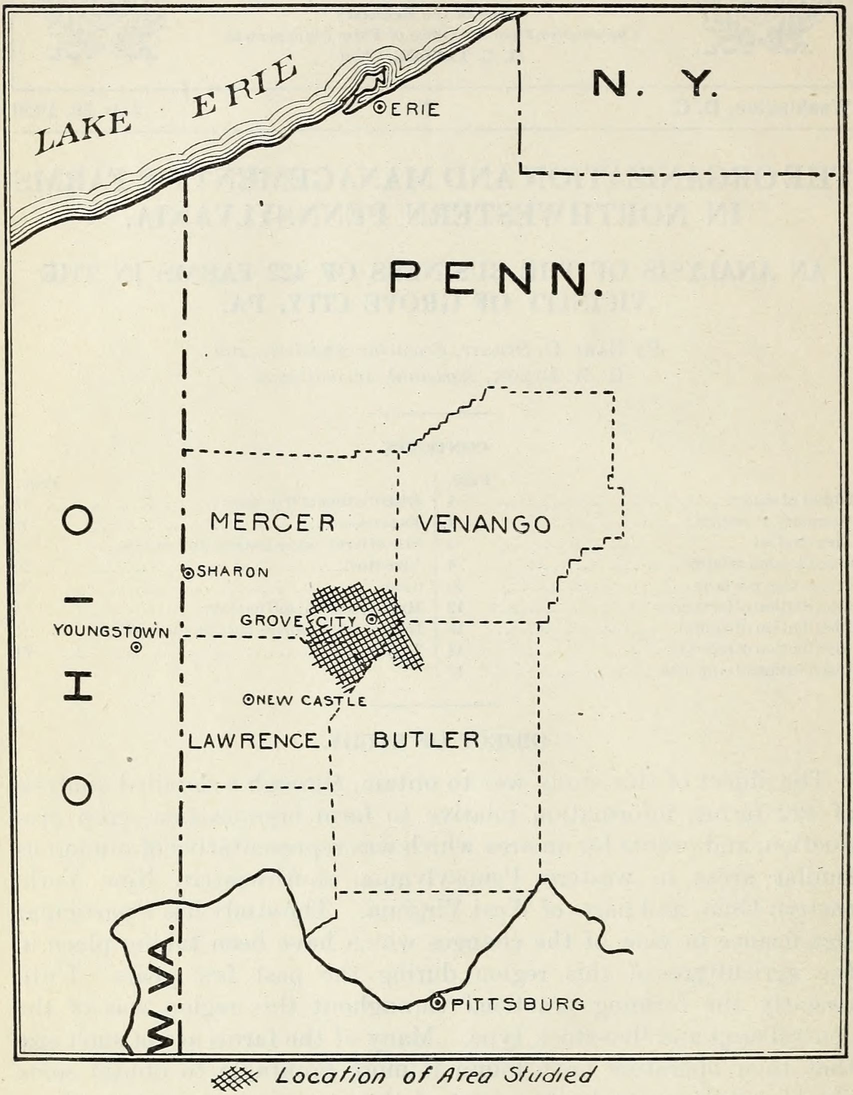

FIG. 1.—Western Pennsylvania, shaded portion showing area where this study was conducted.

SUMMARY OF RESULTS.

The more important facts brought out by this study may be summarized as follows:

Type of farming.—General live-stock and crop farming, until recently the type followed almost exclusively in the Grove City area, is being gradually superseded by the dairy type. At the time of this survey, 46 per cent of the farms studied might be classed as dairy farms.

Size of farm.—The 422 farms studied averaged 101 acres in size, 60 per cent of the land being tillable. The 40 per cent nontillable was mostly used for pasture. The average value of real estate was $57 per acre.

Capital invested.—The average capital invested in the dairy farms was $8,112 and in the general farms $7,252. About three-fourths of this represented real estate. It required a working capital of $1,994 to operate the average dairy farm and of $1,746 to operate the average general farm.

Income.—For the year 1916 the average labor income of 159 dairy farms was $279; of 190 general farms, $291.[1]

For all farms the amount available for family living averaged $740. This was in addition to the value of food products, fuel, and use of house furnished by the farm without money cost. The average amount available for family living on the dairy farms was $773 and on the general farms $714.

For all farms of 70 acres or under, the average amount available for family living was $568; for the farms of over 130 acres, it was $1,152. One-eighth of the men operating farms of over 130 acres made labor incomes of $1,000 or more, and one-third made labor incomes of $500 or more.

Receipts.—About three-fourths of the total receipts for all farms came from live stock. Dairy products, cattle, poultry, and hogs were the four leading sources of income. The leading cash crop is wheat, returns from that crop representing over one-fourth of all returns from crops. Wheat, however, occupies but one-tenth of the crop area on the average farm.

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[1] Certain terms as used in this bulletin are here defined:

Farm investment.—The value at the beginning of the farm year of all real estate, machinery, live stock, and other investment used to carry on the farm business. It includes the value of the farm dwelling, but not the household furnishings.

Receipts.—The amount received from the sale of crops, the net increase from stock, and the receipts from outside labor, rent of buildings, etc. The net increase from stock is found by subtracting the sum of the amount paid for stock purchases and the inventory value at the beginning of the year from the sum of the receipts from stock products, sales of live stock, and the inventory value at the end of the year. If the value of crops or supplies on hand is greater at the end of the year than at the beginning, the difference is considered a receipt.

Expenses.—The amount of money paid out during the year to carry on the farm business, together with the value of the unpaid labor performed by members of the family. If the value of crops or supplies at the end of the year is less than at the beginning, this is considered an expense. Household or personal expenses are not included.

Farm income.—The difference between receipts and expenses. It represents the amount of money available for the farmer's living above the value of family labor, provided he has no interest to pay on mortgages or other debts.

Labor income.—The amount that the farmer has left for his labor after 5 per cent interest on the farm investment is deducted from the farm income. It represents what he has earned as a result of his year's labor after the earning power of his investment has been deducted. In addition to the labor income the farmer receives a house to live in, fuel (when cut from the farm), garden products, milk, butter, eggs, etc.

Per cent on investment.—The rate returned on the farm investment after the value of the farmer's labor is deducted from the farm income. It represents what the investment earns after all expenses have been deducted and the farmer has received a fair wage for his labor.

The dairy farmers who sold all their milk for butter fat made higher labor incomes than those who sold butter only, or butter part of the year and creamery milk part of the year. These men also realized higher prices per pound for butter than those who sold butter only.

One-seventh of the receipts from live stock came from poultry.

Hogs were kept on nearly every farm, but receipts from hogs were only 8 per cent of all farm receipts.

Less than 3 per cent of the total farm receipts were from sheep.

Receipts from beef cattle were of considerable importance on some of the larger general farms.

Use of silo.—Over one-half of the dairy farmers use the silo. On the dairy farms where silage was fed it was found that only 38 per cent of the feed used was in the form of concentrates, while on those without silage concentrates constituted 47 per cent of the total feed. Production per cow was greater on the farms where silage was used.

AREA STUDIED.

The 422 farms visited in making this study lie within a radius of about 10 miles of Grove City, in northwestern Pennsylvania. The area covered included farms in Mercer, Butler, and Lawrence Counties. More of them, however, were in Mercer County than in either of the others. This study was made in the summer of 1917 in cooperation with the farm management department of the State College of Agriculture, State College, Pa.[1]

DESCRIPTION OF THE AREA.

The surface of the region about Grove City is rolling. (See fig. 2.) Most of the area drains into a stream known as Wolf Creek, which crosses it about the center. Bordering this stream and its tributaries are considerable tracts of swamp land, but little of which has been drained. Scattered through the area are quite extensive bodies of timber, consisting principally of hardwoods.

The soils of this region are of glacial origin and mostly belong to the Volusia and Canfield series.[2] They are the result of feeble glaciation of shales and sandstones. In texture these soils vary from a clay to a coarse sand. On steep areas the soils are generally stony. The alluvial soils of the bottoms are especially variable in texture, ranging from sands to heavy clays. In some of the swamps a considerable amount of muck soil may be found.

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[1] Acknowledgment is due to the Dairy Division of the U. S. Department of Agriculture for help and suggestions in planning and conducting the work; to Messrs. E. O. Anderson, of the Pennsylvania Agricultural College; F. Montgomery, C. E. Hope, H. L. Chance, C. E. Miller, of the Office of Farm Management; and J. Coke and J. C. Neale, of the Ontario Agricultural College, who assisted in collecting the field data. Thanks are also extended to the many farmers of the region who furnished the details concerning their farm business which has made this publication possible.

[2] See soil survey of Mercer County, Pa., 1919.

The principal market is Grove City, though a few farmers sell some of their produce in Harrisville, Mercer, and New Castle, Pa.

Railway transportation is furnished by the Bessemer & Lake Erie and the Pennsylvania Railroads. There are a few miles of macadam road. The Pittsburgh and Erie and the Pittsburgh and Franklin roads, which are kept in somewhat better condition than the average country road, run through portions of the area.

The region has been settled for about 100 years, and the type of farming is general in nature. Until the establishment of the creamery, general crop and live-stock farming prevailed. Since that time, however, much more attention has been given to dairying. The leading crops, from the standpoint of acreage, according to the United States Census reports, have been hay, oats, corn, wheat, and buckwheat, arranged in order of acreage, and the relative proportion of the total crop acreage devoted to these crops has changed but little. Similar data show that there has been but little change in the proportion of the different classes of live stock.

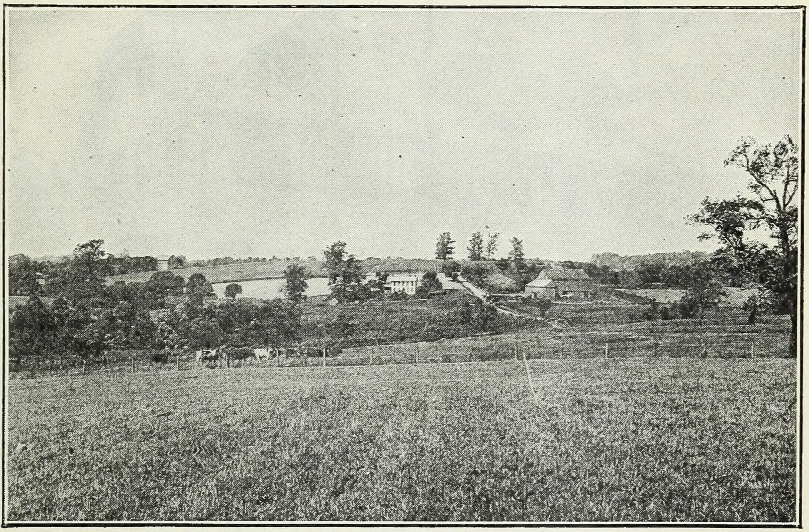

FIG. 2.—View showing typical topography of region.

THE GROVE CITY CREAMERY.[1]

In May, 1915, the Dairy Division of the United States Department of Agriculture organized and began to operate a creamery at Grove City. (See fig. 3.) This creamery has been very successful. Because of the excellence of the products manufactured, patrons have received good prices for their milk.

Indirectly the creamery has been of benefit to the community in that it has served to maintain at a more stable level throughout the year the prices paid for butter. Many farmers stated that before the establishment of the creamery the hucksters made their own prices, which were very low during the summer months. Now, owing to the keen competition, the prices of dairy products during the months of large production have not been so low as formerly.

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[1] See "How Dairying Built Up a Community," Yearbook Separate 65.

The creamery building was constructed according to plans made by the engineers of the Dairy Division and financed by a stock company organized by the business men of Grove City. This building was taken over by the Department of Agriculture on a long-term lease which insured the stock company a reasonable return on its investment. It provides facilities for conducting investigations which can not be carried on in the laboratories in Washington, and also provides facilities for studying methods of creamery operation in general.

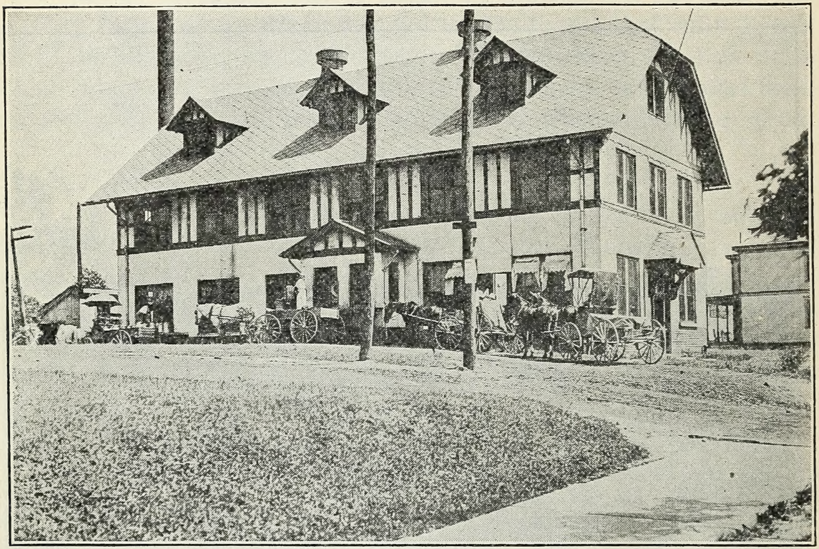

FIG. 3.—Creamery at Grove City.

The creamery buys both cream and whole milk. Principally on account of the large sales of cottage cheese made from skim milk, the creamery has been able to pay good prices for whole milk, and many of the best dairymen are now selling their entire product instead of separating the cream and feeding the skim milk to calves and pigs.

CLASSIFICATION OF FARMS.

Reports from 422 farmers are used as a basis for this study. Sixty-three of these derived the greater portion of their receipts from work off the farm. These cases are discussed under "Income from sources outside the farm," page 30. On 10 farms the greater part of the crop area was rented out. These farms are discussed under "Tenure," page 31.

On 159 farms the leading enterprise is dairying, and on 190 the farming is general in type. The grouping of the farms into these two types was made on the basis of the size of the business enterprises contributing to the farm income. Farms on which dairying was the leading or one of the important phases of the farm business were classed as dairy farms.

Inasmuch as dairying and general farming represent the two more important types of farming followed in this area, this inquiry naturally developed into a comparative study of the farms following these two types. In many ways the dairy and general farms are similarly organized, however, and in order to simplify some of the tables averages are given for both types together, any special differences being noted in the accompanying text.

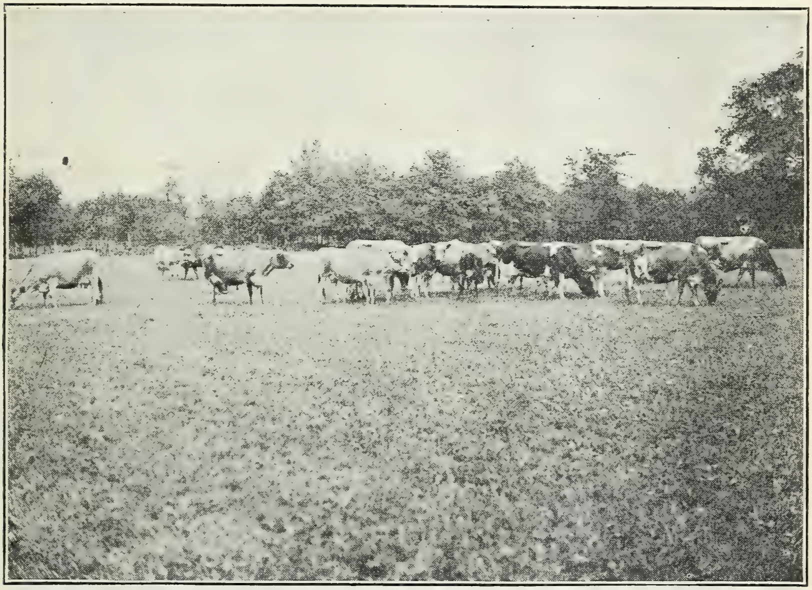

FIG. 4.—One of the better dairy herds of the region.

Until recently the so-called mixed or general type of farming was no doubt better adapted to the majority of farms in this area than a highly specialized type. While dairy farming has not been followed long enough to show any marked increase in profits over the other types, conditions over a large part of this area are especially favorable for the development of dairying. The relatively large acreage and good yields of hay, together with fair yields of silage corn, good pasturage, abundance of good water, and a good market, indicate a promising future for the dairy business. (See figs. 4 and 5.)

TABLE I.—*Summary of the farm business of 159 dairy farms and 190 general farms, Grove City, Pa., area, 1916.*

	Dairy farms (159).	General farms (190).
	Average.	*Average.*
Farm area	97	104
Crop area	48	48
Months of man labor	17	16
Number of productive animal units[1]	15	13
Number of work stock	3	3
Investment	$8,112	$7,252
Receipts	1,366	1,135
Expenses	681	482
Farm income	685	653
Interest on investment at 5 per cent	406	362
Labor income	279	291
Value of farmer's labor	$356	$316
Per cent on investment[2]	4.1	4.7
Farm income	$685	$653
Value of unpaid family labor	102	67
Family income[3]	787	720
Interest paid on indebtedness	14	6
Amount available for family living and savings	773	714

[1] Inncludes all stock except work stock.

[2] After deducting farmer's labor from farm income.

[3] The sum of farm income and value of unpaid family labor, or the amount available for family living and savings had there been no interest to pay.

FIG. 5.—Farmstead of typical dairy farm of the better class.

In Table I is given a summary of the farm business of 159 dairy and 190 general farms. From this summary can be drawn some comparisons of the size of farm, crop area, amount of labor, amount of live stock, capital, receipts, expenses, and profits. All these factors are of vital importance to those operating farms of these types and those contemplating farming under conditions such as exist here.

The average farm income, which represents the difference between the total receipts and total expenses, was $685 on the dairy farms and $653 on the general farms. In the expenses a sum is included for the value of the labor performed on the farm by the farmer's family, which averaged $102 on the dairy farms and $67 on the general farms. Comparing the family income per farm it will be observed that this is $67 higher on the dairy farms.

The labor income, which represents the amount of money the farmer received for his year's labor after paying all farm expenses, including the value of labor performed by his family, and 5 per cent interest on the capital invested, averaged $279 on the dairy and $291 on the general farms. In addition to this these farmers received house rent and what the farm furnished toward the family living.

Figure 6 shows labor income, receipts, and expenses for the 349 farms arranged according to total acreage. Farms of the same total acreage have been arranged according to crop acreage—those having the lowest crop acreage being placed at the left of the acreage group. The upper half of the chart shows labor income (or loss) and the lower half receipts and expenses. The broken and solid bars taken together represent total receipts for the farm, the solid part representing expenses and the broken part farm income; that is, the difference between total receipts and expenses. For a few farms the bars are solid black; this means that on these farms expenses equaled or exceeded total receipts. The dotted lines connecting the two halves of the chart are put in at 10-acre intervals.

This chart furnishes some interesting material for the man contemplating the purchase of a farm where conditions are similar to those prevailing here. For instance, if he has in mind a 60-acre farm, he will see that the farms of this size gave labor incomes of from minus $67 to plus $508. Thus the lower half of the chart, showing receipts and expenses, will give him a good indication of what he might reasonably expect to take in as receipts each year and about what proportion of receipts he might expect to pay out for expenses on farms of different sizes operated under such conditions as prevail in the Grove City area.

In studying this chart it should always be borne in mind that there are efficiently operated farms of all sizes, and that not all the poor farms are small. While it is not possible to tell exactly how much money a man on a 60-acre farm in this area ought to make, this chart shows how much several average, several poor, and several good farmers actually did make in 1916. For this reason a study of this chart ought to be a valuable aid to the better interpretation of the tables of averages given elsewhere in the bulletin, as they show the range of possibilities for farms of any acreage.

An interesting group of farms, each of 100 acres, appears at about the middle of the chart. Note the variation in labor income from a minus labor income of $302 and increasing to a plus labor income of $1,263. This group of farms of the same size shows that while acreage has an important bearing on labor income, there are a number of other factors that are equally important.

A study of the receipts and expenses of these 349 farms shows that even if one knows the receipts of a farm it is not always possible to tell whether the farm is prosperous, though large receipts seem to be a pretty good indication that a farm in this region is prosperous.

It will be noted that labor income increases from left to right—that is, as the size of farm increases labor incomes increase—also that while the little farms do not yield big incomes, neither do they show big losses.

There are two ways of increasing the farm income. One way is to increase receipts and the other to reduce expenses. Too many farmers give too much attention to reducing expenses and not enough consideration to increasing receipts. By referring to the chart it appears that the principal reason why some of these farmers made more money than others was primarily because they increased receipts and not because they reduced expenses. The lower half of the chart shows that on most farms about one-half of the receipts were required for expenses, though on a few farms expenses equaled or exceeded receipts. On some of the more successful farms and on the larger farms in general a lower proportion of receipts was required for expenses than on the average farm. As mentioned elsewhere, the larger farms have a lower proportionate expense for building, fencing, and machinery repair and depreciation than the small farms. Note that some of the average-sized farms (100 acres for this area) have larger receipts than some of the largest farms. Note that the farm with the largest loss (the largest minus labor income) had an acreage large enough for a fair income; the capital was not excessive for farms of this size, but reference to the lower half of the chart shows that the reason for the loss was that the expenses were out of proportion to the receipts. On this farm the unusually large expense was in part due to heavy bills for hired labor.

Figure 7 shows the distribution of the farmer's gross income. In preparing this chart the 349 farms were arranged in four size-groups. The fifth bar shows the average for all the farms. It will be seen that on the larger farms if the farmer is free from debt the amount available for family living is large, even though there is little or no labor income. This sum is made up of the amount required for interest on investment, the value of unpaid family labor, and whatever labor income there may be. On these farms it totals over $1,150.

PRODUCTION PER FARM.

The amount of farm products for sale or for use in increasing the size of business is one of the best measures in studying the efficiency of a farm. While it is important that a farm be so organized as to contribute liberally to the farmer's living, a farm can not be considered profitable until it is yielding enough products for sale to

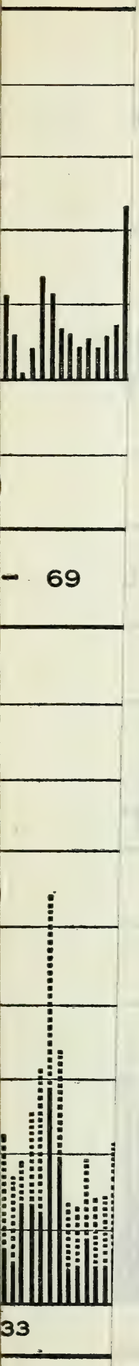
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FIG. 6.—Labor income, receipts, and expenses for 349 farms, Grove City, Pa., area. [The farms are arranged according to total acreage. Those of same total acreage are arranged according to crop acreage, those having the lowest crop acreage at the left.

The upper half of the chart shows labor income and the lower half receipts and expenses. The broken and solid bars taken together represent total receipts, the solid part representing expenses and the broken part farm income. The [illegible] bars that project below the zero line represent minus labor incomes or losses.

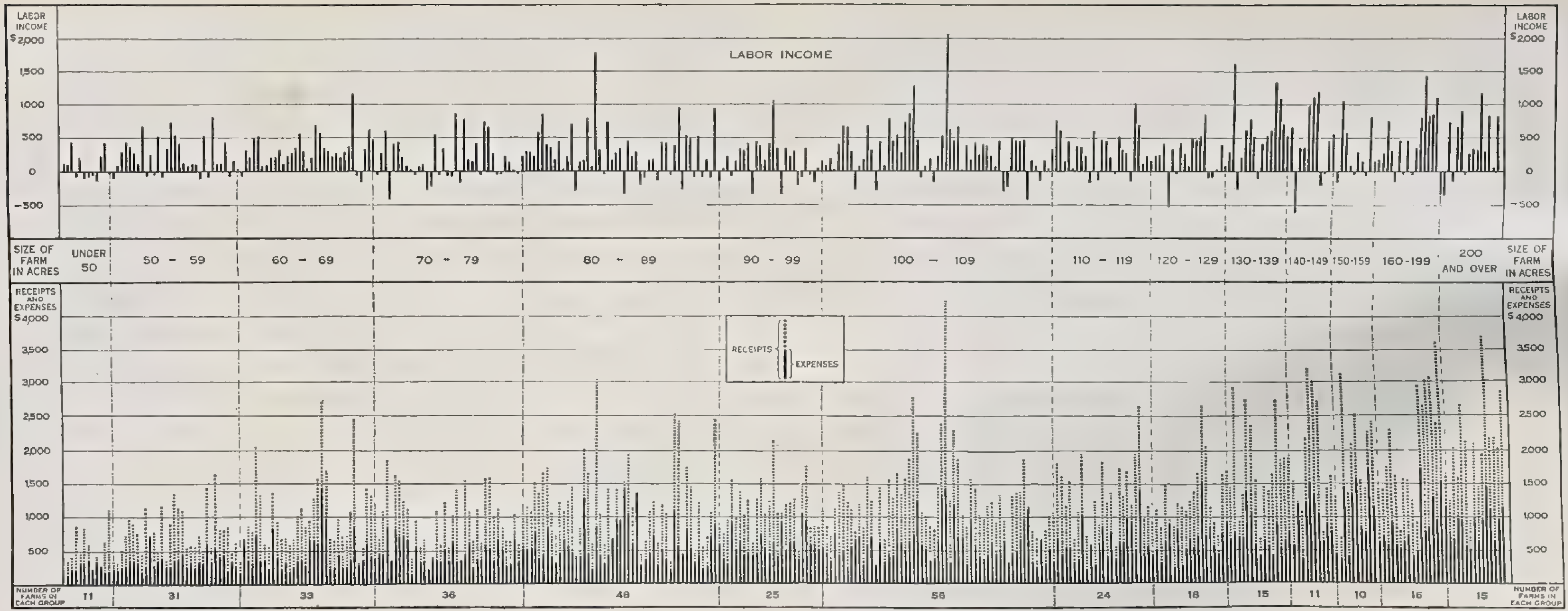
Receipts.—The amount received from the sale of crops, the net increase from stock and the receipts from outside labor, rent of buildings, etc. The net increase from stock is found by subtracting the sum of the amount paid for stock purchased and the inventory value at the beginning of the year from the sum of the receipts from stock products, sales of live stock, and the inventory value at the end of the year. If the value of crops or supplies on hand is greater at the end of the year than at the beginning the difference is considered a receipt.

Expenses.—The amount of money paid out during the year to carry on the farm business, together with the value of the unpaid labor performed by members of the family. If the value of crops or supplies at the end of the year is less than at the beginning this is considered an expense. Household or personal expenses are not included.

Farm income.—The difference between receipts and expenses. It represents the amount of money available for the farmer's living above the value of family labor, provided he has no interest to pay on mortgages or other debts.

Labor income.—The term used to designate what is left for the farmer's labor and managerial ability after deducting from cash receipts and increased inventory all expenses, including an allowance at current rates for the unpaid family labor, depreciation on the equipment, and interest (at 5 per cent) on the value of the farm property. The value of the products consumed by the family and the residence value of the farm house are not included in the income and hence are excluded from labor income.]

LABOR INCOME, RECEIPTS AND EXPENSES, 349 FARMS, GROVE CITY (PA.) AREA.



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maintain itself adequately as a business organization. By this is meant farm receipts of sufficient amount not only to cover the yearly cash outlay, but to pay for the labor and supervision of the farmer and members of his family, and depreciation and interest on investment as well. After the farmer has obtained these various products, he has the option of either turning them into cash or using them in increasing the size of his business.

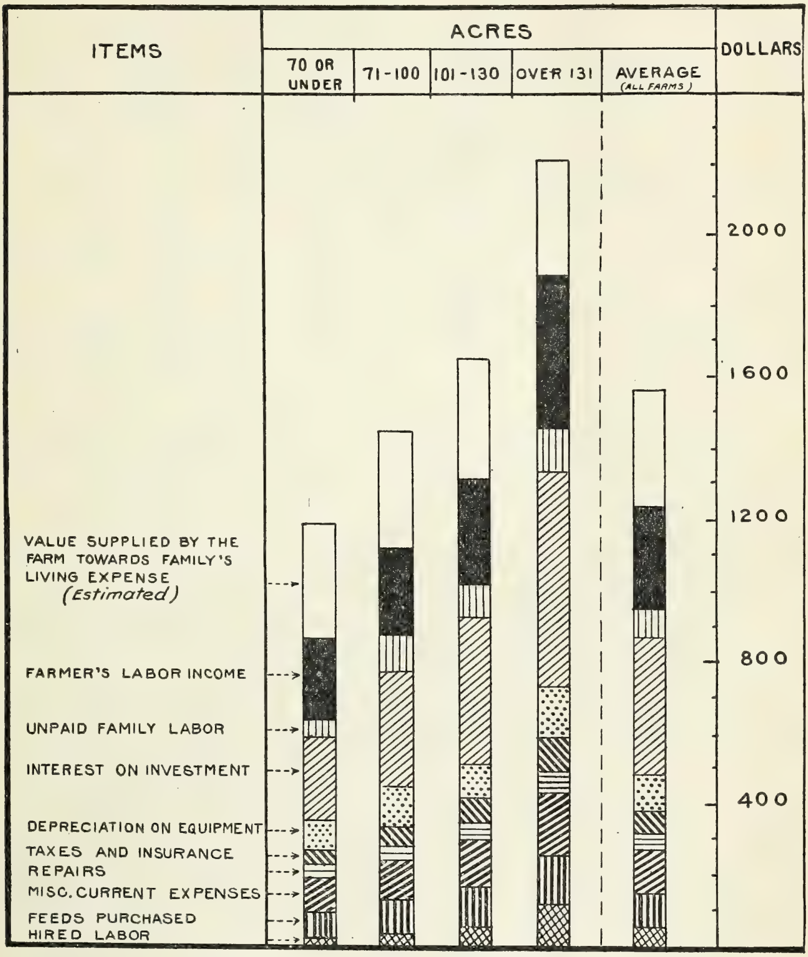

FIG. 7.—Distribution of the farmer's gross income.

Table II shows an itemized account of the various farm products, averaged for the dairy and general farms under study. The dairy enterprise was the one showing the greatest development in this area, and most of the dairy cows were kept for increasing the size of the herd. Part of the young stock was kept in this connection, but most of the other products were turned into cash.

TABLE II.—*Products sold or added to inventory per farm on 159 dairy farms and 190 general farms, Grove City, Pa., area.*

Product.	Unit.	Amount per farm.		Value per unit.	
		Dairy farms.	General farms.	Range.	Average.
Dairy cows	Head	1.8	1	$40.00 to $100.00	....
Cattle	Pound	1,565	2,171	.06 to .09	$0.0779
Horses	Head	0.3	.2	25.00 to 300.00	....
Hogs	Pound	935	1,235	.08 to .12	.0962
Chickens	do	338	391	.12 to .17	.15
Sheep	do	62	543	.065 to .10	.0838
Butter fat	do	1,122	429	.36 to .52	.43
Eggs	Dozen	265	273	.20 to .40	.25
Wool	Pound	5	39	.32 to .65	.36
Corn	Bushel	4	6	.80 to 2.00	.98
Wheat	do	22	32	1.55 to 3.00	1.70
Oats	do	8	16	.70 to 1.00	.72
Rye	do	1	1	1.10 to 1.60	1.06
Buckwheat	do	14	16	.60 to 1.20	1.03
Potatoes	do	19	16	1.50 to 3.00	2.04
Hay	Ton	2.3	5.1	9.00 to 15.00	11.32
Apples	Barrel	5	4	1.50 to 3.00	1.83
Strawberries	Quart	96	6	.08 to .12	.09
Timothy seed	Bushel	.2	.1	2.50 to 4.00	3.36
Clover seed	do	.5	.4	8.00 to 13.00	11.46
Maple sirup	Gallon	2	2	1.00 to 2.00	1.32
Man and team labor	Day	14	8	3.00 to 5.50	4.54
Man labor	do	5	10	1.00 to 3.50	2.57

It will be noted that in only two principal sources of receipts did the dairy farms exceed the general in amount produced for sale. The production of cows and butter fat was greater on the dairy farms.

It should not be inferred that all of the farms sold those products, but the figures given simply represent the average of the farms taken as a whole; for example, of the 349 farms only 75 farms reported sales of sheep or wool, 36 of corn, 159 of wheat, 61 of oats, 16 of rye, 101 of buckwheat, 138 of potatoes, 105 of apples, 10 of strawberries, 134 of hay, 37 of clover seed, and 15 of timothy seed.

Woodland also has a share in the farm production of this area. While, as shown in Table IV, the cash receipts from this source were small, its contributions in the way of fuel and repair material for the upkeep of fences and buildings were of considerable importance.

The range of prices is due to the quality of the product at the time of selling, the fluctuations of market prices, and the marketing ability of the farmer selling them. It is hardly practicable to itemize all of the smaller items of farm receipts, but the above list represents over 90 per cent of the farm receipts and all of the principal sources of receipts.

DISTRIBUTION OF FARM AREA.

The farm area on 349 farms in the region considered averaged in size 101 acres, and in respect to utilization was distributed as follows:

	Per cent.
Tillable area:	
Crop area	48
Tillable pasture	12
Untillable pasture	20
Woodland (pastured)	10
Woodland	4
Waste	6

The average size of the dairy farms was 97 acres and of the general farms 104 acres. The general farms had an average of a little over 6 acres more of pasture than the dairy farms. Woods, the greater part of which is used for pasture, occupy about 14 acres per farm. According to estimates made by 168 of these farmers, it takes 3 acres of average woods pasture to equal 1 acre of average open pasture.

DISTRIBUTION OF CAPITAL.

Table III shows the average amount of capital used and its distribution for the dairy and general farms.

TABLE III.—*Average capital and its distribution on 159 dairy and 190 general farms, Grove City, Pa., area.*

	Dairy farms.	General farms.
Average capital	$8,112	$7,252
Capital distributed to—	*Per cent.*	*Per cent.*
Land	42	44
Dwellings	16	16
Other buildings	17	16
Total real estate	75	76
Live stock	17	16
Machinery	5	5
Feed and supplies	2	2
Cash	1	1

As shown, about three-fourths of the total capital used in the operation of these farms is in real estate. It may be noted that the capital investment of the dairy farms is somewhat higher than that of general farms. On the dairy farms dwellings average $1,334 in value, and all the other buildings $1,369 per farm; on the general farms the average of dwellings is $1,121 each and all the other buildings $1,158. The value of real estate for all the farms here under study averaged $57 per acre.

On the dairy farms the sum of the value of the live stock, machinery, feed, and cash, that is, the working capital, averages $1,994, and on the general farms, $1,746 per farm. In other words, if one were to go into this area and buy the average farm of about 100 acres he would need this much additional to invest in stock and tools before he began to farm. Of course, this does not mean that a man would need this total amount in cash in order to buy and stock the average farm, but that he would have to make an investment of that amount.

Too many farmers make the serious mistake of attempting to operate a farm with too little working capital. It is better to have a mortgage on the farm, if necessary in order to provide sufficient working capital, than to have the farm clear and be handicapped because of the lack of stock and adequate equipment.

DISTRIBUTION OF RECEIPTS.

Table IV shows the sources of receipts on the dairy and the general farms.

TABLE IV.—*Sources of receipts on 159 dairy and 190 general farms, Grove City, Pa., area.*

Source.	Distribution of receipts with reference to sources.	
	Dairy farms.	General farms.
	Per cent.	*Per cent.*
Dairy products	38.4	14.2
Cattle	21.9	25.1
Horses and colts	2.3	4.5
Sheep	.5	5.3
Hogs	6.8	8.9
Poultry	8.7	11.2
All stock	78.6	69.2
Wheat	2.7	4.9
Corn	.3	.5
Potatoes	3.0	2.8
Oats	.4	1.1
Buckwheat	1.0	1.4
Hay	1.8	5.3
Apples	.6	.6
Other fruit	.7	.3
All other crops	.6	.9
All crops	11.1	17.8
Woodland products	.6	1.1
Miscellaneous	6.6	6.9
Increase feed and supplies	3.1	5.0

There was little difference in the percentage distribution of the various receipts in the different size-groups of farms.

Over 60 per cent of the receipts on the dairy farms was received from the sale of cattle and their products, while this source yielded less than 40 per cent on the general farms. The farms of the latter type had a much higher percentage of their receipts from the sale of live stock other than cattle. Another variation in the distribution of receipts on these two types of farms was from the sale of crops. The general farms sold one and one-half times as much wheat and about two and one-half times as much hay per farm as the dairy farms. Receipts from woodland products averaged $11 per farm, comprising $3 from maple sirup and $8 from lumber or wood. Other receipts upon these farms, grouped as miscellaneous, amounted to $83 per farm, and consisted principally of receipts from hauling coal and doing other team work.

DISTRIBUTION OF CROP AREA.

Table V shows the distribution of the crop area on 349 dairy and general farms in the Grove City area.

TABLE V.—*Distribution of crop area on 159 dairy farms and 190 general farms, Grove City, Pa., area.*

	Dairy farms.	General farms.
Average crop area (acres)	48	48
Total crop area in—	*Per cent.*	*Per cent.*
Hay	47.6	48.1
Oats	16.2	16.4
Corn	16.2	14.4
Wheat	9.0	10.3
Buckwheat	3.9	3.9
Rye	1.6	1.4
Apples	3.5	3.8
Potatoes	1.5	1.4
All other crops	.5	.3

There was little variation in the distribution of the area devoted to different crops on the two types of farms. More corn and a little less hay and wheat are grown on the dairy farms than on the general farms. The leading crop, measured by acreage, is hay, which occupies nearly one-half of the crop area. The leading grasses are timothy and clover. On the dairy farms the corn from one-third of the acreage devoted to corn was put in the silo, while less than 1 per cent of the corn acreage on the general farms was handled in this manner.

The grain crops raised in this area, in the order of their importance, are oats, wheat, buckwheat, and rye. A comparison of the area devoted to each of these on the two types of farms shows practically no difference except in the case of wheat. For the farms reporting wheat the average area per farm devoted to this crop was 4.8 acres on the dairy farms and 5.4 acres on the general farms.

Some fruit is grown throughout this area, but it is used mostly for home use.

DISTRIBUTION OF LIVE STOCK.

Table VI shows the distribution of live stock on 349 dairy and general farms in the Grove City area.

TABLE VI.—*Distribution of live stock on 159 dairy and 190 general farms, Grove City, Pa., area.*

	Dairy farms.	General farms.
Total live stock per farm (animal units)[1]	18	16
Animal units represented by—	*Per cent.*	*Per cent.*
Dairy cows	44	28
Other cattle	22	30
Horses and colts[2]	21	23
Sheep	1	5
Hogs	7	8
Poultry	5	6

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[1] An animal unit is a mature horse or cow, or as many smaller animals as require the feed of a horse or cow, namely, 2 head of young cattle, 5 hogs, 7 sheep, or 100 hens.

[2] Includes 3 head of work stock.

On dairy farms, the dairy cows made up 44 per cent of the total number of animals, when expressed in the terms of a mature cow or horse, and 28 per cent on the general farms. On the dairy farms 66 per cent of the total number of animal units were cattle, and on the general farms 58 per cent. Seven per cent of the other cattle were beef cattle and 19 per cent young cattle, bulls, or breeding stock.

Two and seven-tenths per cent of all the animal units were colts. On the 349 farms 80 colts were raised during the year, or 1 for every 13 horses kept.

Most of the sheep in the area are found on the general farms. Only 3.1 per cent of all the stock on the 349 farms were sheep.

About 90 head of poultry were kept per farm.

EXPENSES.

The expenditures for most purposes were practically the same on the two types of farms under study. The dairy farms, however, had an average expense of $199 more per farm than the general farms, due principally to extra expenditure for feed and labor.

In operating a farm there is a direct relation between the type of farming and the percentage of receipts required for operating expenses. Fifty per cent of the total farm receipts were required for operating expenses on the dairy farms and 42 per cent for operating expenses on the general farms. Taking both groups together, 46 per cent of the receipts were required for operating expenses.

TABLE VII.—*Distribution of expenses on 159 dairy and 190 general farms, Grove City, Pa., area.*

Item.	Distribution.	
	Dairy farms.	General farms.
	Per cent.	*Per cent.*
Hired labor and board	9.0	9.2
Family labor	15.0	13.9
Repairs:		
Machinery	1.6	1.5
Buildings	4.0	4.8
Fences	1.6	2.3
Feed bought:		
Hay, etc	.9	.6
Grain, etc	21.1	10.4
Breeding fees and veterinary	1.7	1.9
Seeds	2.5	4.2
Fertilizer	4.7	6.4
Thrashing and clover hulling	1.9	2.5
Baling, machine work, fuel, and oil	1.6	2.6
Insurance	1.2	1.5
Taxes	8.1	11.4
Milk hauling	3.2	1.2
Miscellaneous[1]	5.0	5.5
Total current expenses	83.1	79.9
Depreciation:		
Buildings	9.3	11.0
Machinery	7.6	9.1

[1] Includes feed grinding, silo filling, fodder shredding, horseshoeing, spray material, twine, pasture rent, and barrels.

Seventeen per cent of all the expense of the farms was for feed. On the dairy farms cost of feed averaged 22 per cent of the total farm expense, and on the general farms 11 per cent. The average feed bill on the dairy farms amounted to $149. On the 349 farms taken as a whole, 26 per cent of the total farm expense was for repairs and depreciation on buildings, machinery, and fences. In other words, over one-fourth of the total farm expense was for maintenance of property.

Fourteen per cent of the expense was for family labor, 9 per cent for hired labor, and 10 per cent for taxes. All the other expenses were small, the only two that amounted to more than 3 per cent of the total farm expenses being fertilizers, 5.4 per cent, and seeds, 3.3 per cent.

Analyzing the expenses by size-groups, we find that on the farms with an area of 70 acres or under 30 per cent of the total farm expense was for repairs, depreciation of buildings, machinery, and fences, while on the group of largest farms, those with an area of 130 acres or over, these items amounted to 24 per cent of the total farm expense. This serves to emphasize the fact that, in general, the larger the farm of a given type the lower proportionately will be the maintenance expenses; that is, the larger farms show greater efficiency in that machinery, buildings, and fencing expenses are proportionally reduced.

Fourteen per cent of the farmers rented additional pasture land, usually parts of tracts without buildings or of lands held by mining companies, the houses thereon being occupied by miners. Those renting thus usually pay about $1 per acre, as this is not good pasture land, being usually grown up with brush or partly in woods. Where it is rented by the month, the price is usually 75 cents to $1 per head of stock pastured per month. The average expense for pasture hire on the farms that rented was $21.20 per farm.

SIZE OF FARM, ORGANIZATION, AND PROFITS.

Twenty-three per cent of the farms covered in this study were 70 acres or under in size, while 18 per cent contained over 130 acres. By dividing the farms into four groups, those containing 70 acres or under, those of 71 to 100 acres, those of 101 to 130 acres, and those of over 130 acres, a series of averages is obtained that should be of practical value to the farmers of this region. The dairy farmer with 70 acres or under is thus enabled to note how the average farm following this same type is organized and operated in this region. Like comparisons may be drawn for each of the four size-groups.

A number of factors, such as labor requirements and live stock returns, differ considerably in the operation of a dairy farm as compared with that of a general farm, and for this reason separate tables are presented showing data on these fundamental factors of efficiency for each type.

DAIRY FARMS.

In Table VIII is shown a summary of the farm business on 159 dairy farms, arranged in groups according to size of farm.

TABLE VIII.—*Summary of the farm business of 159 dairy farms, Grove City, Pa., area.*

	Averages by farm area groups.			
	70 acres or under.	71 to 100 acres.	101 to 130 acres.	Over 130 acres.
Number of farms	37	66	32	24
Farm area (acres)	57	88	113	161
Crop area (acres)	33	43	54	75
Months of labor	15	17	19	22
Productive animal units	10	13	17	22
Work stock	2	3	4	4
Investment	$5,606	$7,259	$9,318	$12,712
Receipts	1,010	1,218	1,532	2,098
Expenses	484	607	771	1,067
Farm income	526	611	761	1,031
Interest on investment at 5 per cent	280	363	466	635
Labor income	246	248	295	396
Value of farmer's labor	$349	$337	$370	$399
Per cent on investment [1]	3.2	3.8	4.2	5
Farm income	$526	$611	$761	$1,031
Value of unpaid family labor	57	106	110	153
Family income [2]	583	717	871	1,184
Interest paid on indebtedness	15	7	16	32
Amount available for family living	568	710	855	1,152
Crop yields per acre [3]	102	100	104	98

[1] After deducting farmer's labor from farm income.

[2] The sum of farm income and value of unpaid family labor, or the amount available for family living had there been no interest to pay.

[3] Percentage of average for all farms.

The dairy farms 70 acres or under in size with an average of 33 acres of crops, 10 units of productive live stock, and $5,606 capital, returned the operator a labor income of $246. In operating farms of this size it required 15 months of man labor and an average of over two work horses per farm.

On the farms of over 130 acres in size, 75 acres of crops were raised and 22 productive animal units were kept per farm. With $12,712 capital these farms returned their operators an average labor income of $396. An average of 22 months of man labor per year was required in operating farms of this size and nearly four work horses.

The per cent returned on investment, found by deducting the value of the farmer's labor from the farm income, varies from 3.2 per cent on the smallest size-group to 5 per cent on the farms in the largest size-group.

In operating farms under conditions similar to those in this area the family income is of much interest, as it is the amount of money available to pay living expenses, interest on indebtedness, and savings. The family income averaged $583 on the farms of the smallest size-group, and increased with each size-group to an average of $1,184 on the largest size-group.

GENERAL FARMS.

Table IX shows a summary of the farm business on 190 general farms arranged in four groups according to size of farm.

TABLE IX.—*Summary of the farm business of 190 general farms, Grove City, Pa., area.*

	Averages by farm area groups.			
	70 acres or under.	71 to 100 acres.	101 to 130 acres.	Over 130 acres.
Number of farms	44	64	42	40
Farm area	56	86	113	177
Crop area	31	44	50	70
Months of labor	13	15	15	20
Productive animal units	8	12	13	21
Work stock	2	2	3	4
Investment	$4,308	$6,573	$7,388	$11,432
Receipts	733	1,016	1,149	1,755
Expenses	307	443	477	742
Farm income	426	573	672	1,013
Interest on investment at 5 per cent	216	329	369	572
Labor income	210	244	303	441
Value of farmer's labor	283	319	311	353
Per cent on investment [1]	3.3	3.9	4.9	5.8
Farm income	$426	$573	$672	$1,013
Value of unpaid family labor	30	60	67	116
Family income [2]	456	633	739	1,129
Interest paid on indebtedness	2	9	11	1
Amount available for family living	454	624	728	1,128
Crop yields per acre [3]	102	99	95	103

[1] After deducting the value of farmer's labor from farm income.

[2] The sum of farm income and value of unpaid family labor, or the amount available for family living had there been no interest to pay.

[3] Percentage of average for all farms.

Here, also, it will be seen that labor income increases with size of farm. The average labor income for the smallest size-group averaged $210 and that of the largest size-group $441. The percentage returned on investment ran from 3.3 to 5.8 per cent.

It will be noted that, taken as a whole, the general farmers made labor incomes averaging $12 per farm higher than those of the dairy farmers. However, it will be noted that the average labor income on the two groups of small-sized dairy farms was slightly higher than on corresponding size-groups of the general farms. While the average size of the dairy farms of these two groups was slightly larger than for the corresponding groups of general farms, the main reason for the larger labor incomes is that the dairy business is the more intensive. It is evident that the small general farms are not so well organized, neither are they so well adapted to conditions which exist in this area as are the dairy farms of corresponding size.

Table X shows all farms, by size-groups, classified according to labor income.

TABLE X.—*Number of farms in each size-group making labor incomes as specified (349 dairy or general farms, Grove City, Pa., area).*

Farm area group.	Number of farms in group.	Number of farms with labor incomes of $1,000 and over.	Number of farms with labor incomes of $500 to $999.	Number of farms showing labor loss.
70 acres or under	81	1	12	18
71 to 100 acres	130	3	21	33
101 to 130 acres	74	3	12	13
130 acres and over	64	8	21	15
Total	349	15	66	79

This table shows the chance these farmers have, when operating farms of the various sizes shown, of making a large income.

On the 81 farms 70 acres or under in size, only one operator made a labor income of $1,000 or over, and only 13 made incomes of $500.

In the group of largest farms, those of 130 acres and over in size, one-eighth made labor incomes of $1,000 or more, and nearly one-half labor incomes of $500 or more.

The three preceding tables serve to emphasize what has been brought out in every similar study conducted by the Office of Farm Management thus far, namely, that the smaller farms (except those operated under intensive methods near good markets) are relatively less profitable than the larger ones. In farming, as in every other business, the man with large capital has a much better chance of getting a large income than the one with little capital. It took a capital of $11,912 to give an average labor income of $424 in this area, this being the average capital of 64 farms of 130 acres and over in size.

Often large incomes are made by farmers operating small farms intensively, but in such cases the investment is relatively large. Farm management studies uniformly indicate that the farmers with little capital invested make little money. Size of business is just as important with the farmer as with the merchant.

EFFECT OF YIELDS PER ACRE AND RETURNS FROM LIVE STOCK ON LABOR INCOME.

We have seen in Tables VIII, IX, and X that the larger farms make more money in this area than the smaller ones, and the question arises naturally whether this is due to higher yields or simply to greater production.

Table XI is designed to show the crop yields and live-stock returns for the different size-groups of farms expressed in percentage of the average yields of all farms, known as the crop index.[1]

TABLE XI.—*Average crop and live-stock index on 349 farms, Grove City, Pa., area.*

	70 acres or under.	71 to 100 acres.	101 to 130 acres.	Over 130 acres.
Crop index	102	99	99	101
Live-stock index	102	100	99	99

This table shows that there is very little difference in the crop yields and returns per unit from live stock on the farms of different sizes.

The crop yields expressed in percentage of the average for all farms in the region were 101 per cent on the dairy and 99 per cent on the general farms. The live-stock returns were 111 per cent of the average for the region on the dairy and 91 per cent on the general farms. This does not mean, however, that the live stock on the dairy farms was 20 per cent more profitable than that kept on the general farms. On the dairy farms the receipts per animal unit were higher, but the feed cost per animal unit was also higher, owing to the more expensive feeds consumed by the dairy stock. On the general farms, where more beef cattle and sheep are produced, the returns are comparatively lower than dairy receipts, but the farmers are able to produce these at a much lower feed cost; and the net profit from such stock may be as high as from the dairy stock.

The crop index on the large farms was practically as high as on the small farms, indicating that the old belief that the small farms produce on the average the highest crop yields per acre is not justified by results in this area.

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[1] The crop index may be defined as the crop yields of a particular farm expressed in percentage of the average crop yields of all the farms in the community. It is found as in the following example:

A particular farm produces—

	Acres.
2,000 bushels of corn on	40
1,200 bushels of wheat on	40
900 bushels of oats on	30
120 tons of hay on	80
Total	190

The average yields of the above crops in the community are: Corn, 60 bushels; wheat, 32 bushels; oats, 40 bushels; and hay, $1\frac{3}{4}$ tons per acre. Hence, on the average, the areas required to produce the above quantities of the products mentioned are—

$2{,}000 \div 60 = 33.3$ acres of corn,
$1{,}200 \div 32 = 37.5$ acres of wheat,
$900 \div 40 = 22.5$ acres of oats, and
$120 \div 1\frac{3}{4} = 68.6$ acres of hay.

Total $= 161.9$

Thus, it requires 190 acres on the farm in question to produce what 161.9 acres produces on the average. Hence, 1 acre produces on this farm $161.9 \div 190$, or 85.3 per cent as much as the average acre of the community.

The live-stock index is the percentage comparison of the receipts per animal unit on farms weighted by their receipts, using as the basis the average receipts of all farms in the area expressed as 100.

Table XII shows the effect upon labor income of improving the quality of the stock and increasing the crop yields. Yields per acre and returns per productive animal unit were found to bear the same relation to labor income on dairy farms as on general farms; hence for the sake of brevity the figures for the two groups have been tabulated together.

TABLE XII.—*Effect of yields per acre and returns per productive animal unit on labor incomes, by size of farm, 349 farms, Grove City, Pa., area.*

LABOR INCOME.

Group.	Live-stock index.[1]			
	100 acres or under.		Over 100 acres.	
	100 or less.	Over 100.	100 or less.	Over 100.
Crop index:[1]				
100 or less	$41	$285	$134	$398
Over 100	224	452	340	576

[1] For definition of these terms see page 21.

In order to eliminate the effect of size of business as much as possible, the farms were arranged into two groups. As would be expected, the groups having crop yields and live-stock returns above the average made the most money. This table shows, moreover, that in an area like this, where so great a percentage of the returns is from live stock, it is better to make an effort to improve the quality of the live stock than to try to grow better crops and feed them to poor live stock. Those farmers operating either large or small farms whose crop yields were below the average of those produced in the region, but with live-stock receipts above the average, made higher labor incomes than those having live-stock receipts below the average and crop yields above the average.

LIVE STOCK.

We have seen in Table XII that the farms with crop yields and live-stock returns above the average made more than average labor incomes, and have observed the effect of increasing the receipts per unit of live stock. Table IV showed that over 14 per cent of the receipts on general farms and 38 per cent of the receipts on the dairy farms were from dairy products. It would seem, then, that one of the most direct and effective ways of increasing the income of the farmers of this region is to follow those practices that tend to increase production per cow.

Accurate data were obtained on 265 farms, averaging 6 cows per farm, where the cows were kept for dairy purposes, which showed that the average sales of butter fat per cow was 116.6 pounds. This is a rather low production per cow. It was possible to get accurate data of the butter fat sold per cow on 123 of the 159 dairy farms, but for the rest of the dairy farms it was not possible to get this figure accurate enough for these tables, because some of the dairymen sold market milk in Grove City or Harrisville, and others shipped this product for a part of the year to Youngstown, Ohio, and to New Castle, Pa. Some farmers sold market milk locally to miners and others living in the area.

The average labor income of the 123 farms furnishing butter-fat data was $259, while the average labor income of all the dairy farms was $279. This indicates that the 123 farms are fairly representative. The pounds of butter fat sold per cow and the labor income of the farms selling butter only, of those selling creamery milk, and of those selling both butter and creamery milk is shown in Table XIII.

TABLE XIII.—*Sales of butter fat per cow and labor income of 123 dairy farms selling products as specified, Grove City, Pa., area.*

	Number of farms.	Number of cows per farm.	Pounds butter fat sold per cow.	Average labor income.
Farms selling—				
Butter only	19	6	129.2	$79
Creamery milk	75	8	150.8	325
Butter and creamery milk	29	7	125.1	208

The farmers who sold butter and no other dairy products received an average of 35 cents per pound for their butter-fat product. Those selling butter and creamery milk received 41 cents per pound, and those who sold only to the creamery 43 cents. Those who sold to the creamery received 8 cents per pound more for their butter fat than those who sold butter only, or about one-fourth (24 per cent) more per pound. If the farmers who sold butter only had shipped their product to the creamery and had averaged the same production of butter fat the receipts per cow would have averaged $10.34 higher, and as these farms averaged 6 cows per farm would have received $62 per farm greater income. There were 82 general farms that sold butter only, and their sales of butter fat per cow were 84.5 pounds, which brought them an average of 33 cents per pound. With the same production per cow, other things being equal, they would have received $8.45 more per cow and $40 greater income per year if their milk had been sent to the creamery.

Most of the farmers of the area keenly realize the advantage of shipping their milk to the creamery, and the number of patrons of the plant is increasing rapidly. They also realize the need of improving the quality of their herds. One cow-testing association and two bull associations have been formed since April 1, 1917.

During the period April 1, 1916, to April 1, 1917, the 349 farmers bought for their farms 32 head of pure-bred Holsteins, 13 pure-bred Jerseys, 6 pure-bred Guernseys, and 5 pure-bred Shorthorns. In addition to the above pure-bred cattle, many began to improve the quality of their herds through the purchase of good grade stock and also by using pure-bred bulls.

Ten per cent of the total farm receipts and about one-seventh of the stock receipts were from poultry. The receipts from poultry exceeded those from any class of live stock except cattle, were nearly as great as the combined receipts from hogs and sheep, and were over two-thirds as much as the receipts from crops. Fifteen per cent of the farms of the area sold over $200 worth of poultry and eggs per farm. Some of the farmers got good returns from turkeys. Not many ducks or geese were kept in the area. A reasonable increase in the amount of poultry, including turkeys, would seem warranted on many of the farms, especially on the farms with an abundance of family labor. Increased attention could be given to the poultry business without any interference with the major operations of the farm.

The receipts from hogs made up 8 per cent of all the farm receipts, besides furnishing an average of 594 pounds of pork per farm for family use. Hogs were kept on nearly every farm, except some that sold whole milk to the creamery or as market milk.

Receipts from sheep made up less than 3 per cent of the total farm receipts. The coarse-wool sheep predominated and the Shropshire was the principal breed. Only about 1 farmer in 12 following the dairy type kept sheep, while they were kept by one-third of the general farmers. The flocks averaged 15 head and produced 12 lambs per flock.

There were a few farms in the area where the stock sales were principally from beef cattle, but not enough of them to justify drawing any definite conclusions relative to the comparative profitableness of dairy cattle and beef cattle.

During the year of the survey the prices received for beef cattle were relatively higher than the prices received for dairy products, and consequently the beef-cattle farms would show a little higher labor income on the average than would an equally efficient group of dairy farms. Steers were kept on most of the general farms. The labor income of the general farms is a little higher than that of the dairy farms. On some of the larger farms very good returns were realized last year from beef cattle.

It is probable that beef cattle can be raised at a profit on many of the larger farms, particularly those having large areas of rather wet pasture not adapted to sheep raising. Beef cattle require much less care than dairy cows, and where there is a shortage of labor on the farm the raising of beef cattle may be advisable.

Bulletin 150 of the Pennsylvania State Agricultural College, "Raising Beef Cattle," furnishes good data on raising beef cattle. Part of the conclusions set forth in this bulletin are as follows: "Beef production is adapted to and will be found profitable under Pennsylvania conditions on land valued at $60 or less per acre that can maintain cows at the rate of 2 acres per head during the pasturing season, and on which corn can be raised for silage."

CROPS.

For comparison with crop yields received on these farms for the year under study, corresponding yields as given in the United States Census reports for the years 1900 and 1910 are here presented. The average yields of the three counties in which the survey was made, as given in the last two census reports, are taken together to give a figure applicable to the whole area.

The yield of corn for the year covered by this study was about normal, being 34 bushels per acre as compared with yields of 33 and 32 bushels given in the last two census reports for these three counties. On well-drained land an excellent crop of corn was harvested in 1916, but on many fields a large part of the corn was soft and of poor quality. Silage yielded an average of 7¼ tons per acre. Most of the seed corn planted for grain is produced on the farm, but a considerable part of the seed for silage corn is bought. The climate here is less favorable for corn growing than that of many other areas. It is highly advisable to have a vigorous, early-maturing strain of corn, that yields well. Each farmer should make an effort to improve his strain of corn, which can be done quite easily by field selection of the seed.

The yield of wheat was the same as that given for the area in the last two census reports. Wheat was the principal cash crop of the area, 3.8 per cent of the total farm receipts and over one-fourth (26 per cent) of the receipts from crops being from sales of this grain, The average yield in 1916 was 16 bushels per acre, and the average amount sold per farm reporting was 61 bushels.

There are some farms in this area not well adapted to wheat on which rye could be introduced into cropping systems with profit. Rye is hardier than wheat and will grow on poorer soils.[1]

The average yield of oats for the year of the survey was 30 bushels, as compared with census figures of 34 and 26 bushels. This crop occupies 16.3 per cent of the crop area of all the farms under consideration. It is an important crop in this area and nearly all of it is fed on the farm. Much of the grass seeding is put in with oats. Smut causes some damage to the crop each year, and a few farmers have been using the formaldehyde treatment for it. By the use of this simple and inexpensive treatment the losses from oat smut can be reduced to a minimum.[1]

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[1] For more details concerning the growing of rye, see Farmer's Bulletin 756, "Culture of Rye in the Eastern Half of the United States."

The yield of buckwheat was 15 bushels per acre, as compared with yields of 16 bushels per acre for the census reports of 1900 and 1910.[2] About one-third as much land is devoted to buckwheat as to wheat. Buckwheat is a good crop to put on rough or weedy land. A good deal of buckwheat is sold, some is used in the house, and a large quantity is fed to the chickens. It makes an excellent chicken feed.

The average yield of hay for the year 1916 was 1.7 tons per acre. The yield of this crop in the three counties in which the survey was made, for the United States Census of 1900 and 1910, respectively, was 1.1 and 1.2 tons. The hay crop in this area was large in 1916, but farmers generally said that the feeding value was somewhat lower than usual. Hay is the leading staple crop of the region, and consists principally of clover and timothy. Much of the red clover seed used is grown on the farm. This is the medium red variety. The alsike clover seed used is purchased. A considerable part of the timothy seed required for farm use is obtained by stripping the heads from selected portions of the hay field. With care, seed of an excellent quality can be obtained by this method. Some of the farmers leave patches of timothy hay standing for seed. A few use the barn-floor sweepings for their source of supply of timothy seed.

The yield of potatoes was somewhat below normal, 68 bushels per acre, as compared with yields of 102 and 93 bushels given in the last two census reports. The higher prices obtained, however, would about make up for the loss due to low yield. Potatoes, however, are a relatively unimportant crop in this area, occupying but 1.5 per cent of the total crop area, or about seven-tenths of an acre per farm.

Little attention has been paid to orcharding in this area. Few of the farmers spray their trees, and many do but little pruning. In one part of the area surveyed one farmer who runs a special fruit farm does considerable spraying for his neighbors, using a small power sprayer. This farmer sold $175 worth of apples, $300 worth of cherries, $100 worth of peaches, $100 worth of plums, and $124 worth of strawberries. A small quantity of pears and prunes were produced and sold in this area.

In general, market conditions are such that it would be inadvisable to increase to any great extent the acreage devoted to truck crops in this area, yet on many farms, especially on those where there is a large family at home, the addition of some special crop like strawberries, raspberries, or blackberries would materially increase the farm income with practically no expense for extra hired labor in picking. Some farms in this area have soil adapted to the growing of onions, much of which is not being utilized, except for general farm crops. If some of this land were devoted to the onion crop the farm receipts would be considerably increased, and in most cases all of the extra labor required could be done by the family.

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[1] For information in controlling cereal smuts see Farmer's Bulletin 939, "Cereal Smuts and the Disinfection of Seed Grain," which may be obtained free from the U. S. Department of Agriculture.

[2] For further details concerning the growing of buckwheat, see Farmers' Bulletin 1062, "Buckwheat."

Table XII shows that it is more important to increase the quality of the live stock than to increase the crop yields. However, one must not lose sight of the fact that it is very important to maintain crop yields.

FARM FEEDS AND THE SILO.

The use of silos is becoming quite general, there being 113 on the 349 farms studied when this survey was made. Eighty of these silos were on dairy farms. Thus over one-half of the dairy farmers were using silos. During the farm year 11 new silos were built. The average yield of corn for silage was 7¼ tons per acre, and on several farms the yield was over 10 tons.

It was possible to obtain accurate figures of the pounds of butter fat per cow on 56 dairy farms that had silos and on 67 farms that had none. Table XIV shows the average investment per farm, average crop acres per man, total feed units required per animal unit, the average number of cows per farm, the sales of butter fat per cow, and the labor income on 56 dairy farms having silos and on 67 dairy farms without silos.

TABLE XIV.—*Average investment per farm, average crop acres per man, average feed units*[1] *required per animal unit, average number of cows per farm, the sales of butter fat per cow, and the labor income on 56 dairy farms having silos and 67 dairy farms without silos, Grove City, Pa., area.*

	Average investment per farm.	Average crop acres per man.	Average feed units per animal unit.	Average number of cows per farm.	Average pounds of butter fat sold per cow.	Average labor income.
56 farms with silos	$9,013	37	3,481	9	151.5	$346
67 farms without silos	6,610	32	3,336	6	132.8	187

[1] A "feed unit" represents the feed value of a pound of corn or its equivalent.

1 bushel corn=56 feed units.	1 ton bought feed=2,000 feed units.
1 bushel wheat=60 feed units.	1 ton fodder (stover)=500 feed units.
1 bushel oats=29.1 feed units.	1 ton silage=333 feed units.
1 bushel rye=56 feed units.	1 ton hay=800 feed units.

Feed units computed according to table in Wisconsin Circular No. 37, June, 1912.

Farmers having silos on their farms fed a little more heavily than those without silos, but they also got a considerably higher butter-fat production per cow. Upon comparing the proportion of concentrates in the feeds consumed on the two groups of farms, it is found that 38 per cent of the total feed units on the farms having silos were concentrates, while on the other farms concentrates averaged 47 per cent of the total. One of the reasons for this lower proportion of concentrates fed on the farms with silos is that good silage itself contains some corn and is therefore partly a concentrate, and also that less concentrate is required, because of the succulent nature of the feed.

Although the cows on the farms having silos produced 18.7 pounds of butter fat more per cow than those on the farms without silos, it should not be assumed that this difference or the corresponding difference in labor income is due wholly or even largely to the silo. The farmers with silos were better all-around farmers than those without. They had a larger average investment per farm, worked more crop acres per man, and had more and better cows. The silo was therefore only one of the several factors contributing to their success.

CROPPING SYSTEMS.

A common rotation on many of the farms is corn or potatoes followed by oats, and then by hay two years or longer. Where wheat is grown, the rotation usually is corn, oats, wheat, hay two or three years. Buckwheat is generally sown on the rougher land or land that has become foul with weeds. On some farms buckwheat follows oats in the rotation and serves as a nurse crop for the grass seed. On many farms the hay is cut as long as it gives a fair yield. Some of the meadows do not run out in four or five years. A few farmers are trying out a rotation of corn, wheat, hay, hay.

Judging by the percentages of area devoted to each crop, it would appear that the rotation most generally practiced is corn and potatoes, oats, wheat, rye or buckwheat, and hay three years.

MAINTENANCE OF SOIL FERTILITY.

One of the important problems of this region is that of keeping up crop yields. The test of good farm management is not only the earning of a good current net income, but the keeping up of the fertility of the soil as well. To keep up this fertility, the farmer must rely on the use of manure, lime, fertilizer, and legumes. Practically the only legumes grown here are red clover and alsike. On the farms where manure is produced in sufficient quantity, manure spreaders were used with very satisfactory results. Too many farmers, however, still practice the wasteful method of throwing the manure outside under the eaves of the barn and hauling it to the field but once or twice a year.

FERTILIZERS.

Commercial fertilizers are quite extensively used. Fifty-one per cent of the farmers concerned in this study used fertilizers on corn, 45 per cent on wheat, 47 per cent on buckwheat, and 36 per cent on oats. Most of the farmers used less than 150 pounds per acre.

Acid phosphate was used by many farmers. Some, however, used more expensive fertilizers. Mixing acid phosphate with stable manure in the barn was not practiced to any extent.

In order to show the effect upon crop yields of increasing the amount of fertilizer and manure used per 100 acres of crops, the 349 farms were grouped as shown in Table XV.

TABLE XV.—*The effect upon crop yields of applying different amounts of fertilizer and of live stock kept on 349 farms, Grove City, Pa., area.*

Animal units per 100 acres of crops.	Fertilizer per acre.								
	None.			100 pounds or under.			Over 100 pounds.		
	Animal units per 100 acres of crops.	Fertilizer per acre.	Crop index.	Animal units per 100 acres of crops.	Fertilizer per acre.	Crop index.	Animal units per 100 acres of crops.	Fertilizer per acre.	Crop index.
		Pounds.			*Pounds.*			*Pounds.*	
35 or under	25	0	82	28	55	92	28	174	98
Over 35	43	0	100	45	63	107	44	160	109

Farmers using over 100 pounds of fertilizer per acre of crops and keeping less than 35 animal units per 100 acres of crops failed to produce as high crop yields as the farmers who used no fertilizer but had over 35 (or an average of 43) animal units per 100 acres of crops. The highest crop yields were obtained by the group using over 100 pounds of fertilizer per acre and keeping over 35 animal units per 100 acres of crops. The crop yields on these farms were 9 per cent above the average of all the farms. The lowest crop yields were on the group

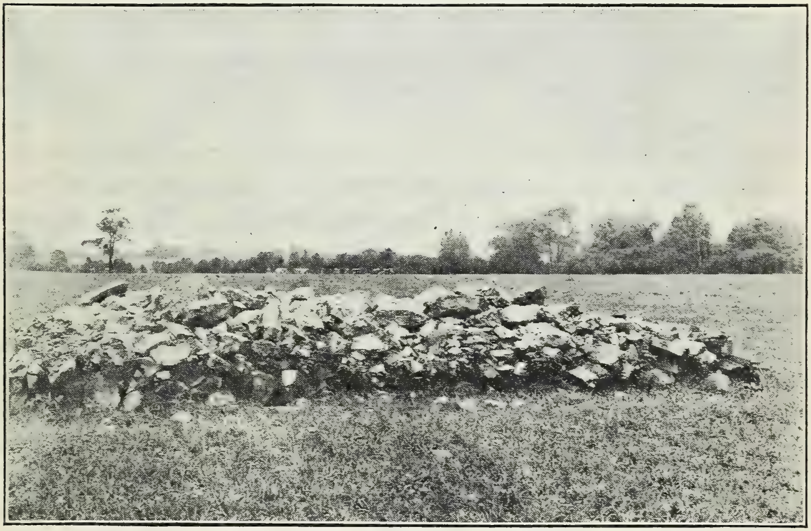

FIG. 8.—Limestone prepared for burning. Either coal or wood may be used.

of farms where no fertilizer was used and with the least density of live stock, the crop yields on these farms being only 82 per cent of the average. These men had little manure to apply and also overlooked the importance of heavier applications of fertilizer in order to offset the lack of farm manure.

The soils of this area are naturally acid, and the use of lime has been found to give very good results. It is always advisable to use lime to insure a good stand of clover. Lime is quite commonly applied to small grains like oats or wheat. Some farmers use ground limestone. In the southeastern part of the area surveyed there were several limestone quarries and small coal mines. Many of the farmers living near these buy the limestone and coal and burn their own lime. (See fig. 8.)

Information as to the use of lime on soils, with specific directions for applying, may be found in Farmer's Bulletin 921, "The Principles of the Liming of Soils."

The lime is usually distributed by hand.

INCOME FROM SOURCES OUTSIDE THE FARM.

Records were obtained from 63 farms where over one-half (56 per cent) of the receipts were derived from outside sources. These farms averaged 71 acres in size with 35 acres in crops. The average total capital per farm was $4,893, receipts $896, expenses $448, farm income $448, interest on capital $244, and labor income $204.

On the average, these 63 farmers spent 139 days at outside labor. The earnings during the time spent off the farm averaged $3.50 a day. Much of the money earned outside was derived from either working in coal mines or else hauling coal from the mines to the railroad. (See fig. 9.) Some worked in limestone quarries. Day labor, work with sawmills, lumber business, labor on roads, school-teaching, milk-hauling, and carrying mail all contributed to the receipts from sources outside the farm business.

As would be expected, crop yields were somewhat lower on those farms where nearly one-half of the time of the operator was spent doing outside work. With some operators, farming was their work during their spare time. This is usually the case where there is plenty of outside work available. Because of the immediate returns it offers, outside work looks especially attractive to those in need of money, while the returns from many farm enterprises do not come in at given intervals of time.

For the study of the management of small farms in this area we have three types: those operated where over one-half of the receipts are received from work off the farm, those operated as general farms, and those operated as dairy farms. That the introduction of dairying into this area has been an advantage in this connection is shown by a comparison of the relative profits received on the farms operated under each of these types. Taking the farms of 70 acres or under in size, there were 38 on which over 50 per cent of the receipts were from work off the farm, the average labor income received being $192, while the average for those following the general type of farming was $210, and for those following the dairy type $246. The farmers following the dairy type had on the average more capital invested than was necessary in following either of the other types, but the additional income received, together with the added advantage of having steady employment throughout the year at home, and in the main being emancipated from the directing authority of others, makes this type the more attractive.

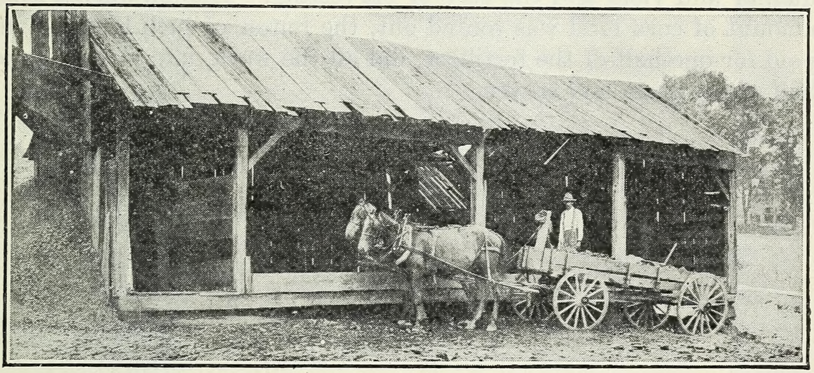

FIG. 9.—Hauling coal from mine. One of the principal sources of outside receipts.

TENURE.

Records were obtained from 10 farm owners who rented out a part of their crop acreage. For the most part these men were considerably older than the average, thus making it necessary for them to get rid of a part of the responsibility of operating the entire farm, yet they continued to live on the farm. The average farm area was 117 acres, with 40 acres in crops, 10 acres of which was rented out. Their total capital was $7,330, average receipts $1,019, expenses $642, farm income $377, interest on capital $366, and labor income $11.

Sixteen farms in the area were operated by tenants. Three of these were dairy and 13 were general farms. The operators paid cash rent. After the landlord's farm expenses, consisting of building depreciation and repair, upkeep of fences, insurance, and taxes, were deducted from the rent received, the landlords received 2.6 per cent on their investment.

Fifty-four farmers in the area increased the size of their business by renting additional land from companies owning land for coal mines or limestone quarries, or from miners living on small tracts of land, or from men owning small tracts and doing very little farming.

The crops most commonly put in on shares were small grains. The division of the crop and expenses varies greatly. A division that is quite common is for the renter to get two-thirds of the crop, he paying two-thirds of the thrashing and fertilizer bill and furnishing all the seed. In other cases he pays all the fertilizer and two-thirds of the thrashing expense.

Where the renter gets one-half of the crop, quite commonly he pays all the thrashing bill and the owner furnishes all the seed and pays the fertilizer expense.

Where additional hay land is rented, the renter usually gets from one-third to three-fourths of the crop harvested, depending upon the quality and yield and the ease of harvesting. Though only a small amount of corn land was rented out, the renter of such land usually paid for one-half of the fertilizer, did all the work, and received one-half of the grain and stover.

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